Introduction

Jowar (Sorghum bicolor (L.) Moench) is the fourth most important world cereal, following wheat, rice and maize. It is the third important cereal in India after rice and wheat. Millions of people in Africa and Asia depend on sorghum as the staple food. It provides fodder to millions of animals all over the world. It is also used in preparing basketory, broom, thatching material, as fuel, etc. The greatest merit with sorghum is that it has capacity to withstand drought, which has facilitated its coverage over large areas in semi-arid tropics. Its performance is better than maize in marginal lands under moisture stress or excessive moisture conditions.

The genus Sorghum (jowar) belongs to family Graminae. The cultivated sorghum probably originated in East Central Africa, in or near Ethiopia or Sudan because of the great diversity of types growing in that region. The date of arrival of cultivated sorghum in India is uncertain. The movement of sorghum out of Africa to East was probably brought about through the dhow traffic. The trading route between East Africa and India, via Arabia is ancient. Sir George Watt (1893) pointed out that there was no specific Sanskrit name for sorghum. It is therefore, supposed that sorghum reached India in 1500 B.C. (Chhidda Singh, 1983).

Sorghum is cultivated under different seasonal soil and climatic conditions. Indian sorghum exhibits wide range of variability with respect to duration, panicle morphology and grain quality.

Sorghum is grown over 43.9 million hectares of total land with production of about 51.8 million metric tonnes in different parts of the world. India cultivating on 16.15 million hectares with total production of about 11.6 million tonnes, sorghum is truly great millet of India. Among the sorghum growing countries India ranks first in acreage but second in production, U.S.A. being the largest producer in the world.

The other important sorghum growing countries are China, Nigeria, Sudan and Argentina. In regard to average yield, U.S.A. ranks first (3947 Kg./ha), followed by Argentina (3033 Kg./ha) and however, in India it is only (717 Kg./ha). Maharashtra , Andhra Pradesh, Karnatak, Madhya Pradesh, Gujarat, Tamil Nadu, Rajasthan and Uttar Pradesh are the important sorghum growing states in India.

Salinity has become one of the serious problems in modern agricultural systems. Saturation of salts in the soil affects the soil composition. These salts from soil affect the germination of seeds and growth of the plant. Millions of hectares of land throughout the world is saline and unproductive.

Some 15.4 % of arid and semi- arid land, which comprises approximately 46.5 % of the total land area of the earth, is salt affected and salinity affects one third of all irrigated land. According to F.A.O. (1972) the countries where salinity problem is more serious are Iran (2,35,00000 hectares), U.S.A. (85,17000 hectares), Pakistan (68,00000 hectares) and India

(6,00000 hectares). According to Ramamoorthy (1968) 10.91 million hectares of saline soils are present in India. In India, U.P., Haryana, Rajasthan and Gujarat are some of the states where Saline soils are predominant. In Maharashtra , an area of about 33,200 hectares has been affected by salinity or alkalinity or both. In addition to this, about 34,000 hectares have been converted into Khar land due to ingress of sea water (Zende, 1968). These soils occur in the districts of Thana, Raigad, Ratnagiri, Sindhudurg, Ahmednagar, Poona, Solapur, Aurangabad, Parbhani, Nasik, Satara, Khandesh and other areas under the Deccan Canals.

The salinity is ever alarming problem and it is increasing day by day affecting food production in the country. Unfortunately no cheaper methods of desalination of soil or water have been achieved to overcome the salinity hazards. According to Epstein et al. (1980), the development of crops tolerant to salinity is a better strategy to meet the challenge of salinity problem. To achieve this, it is of utmost importance to understand the performance and the physiological aspects of plant species and the cultivars under saline conditions.

To achieve the purpose, in the present investigation, an attempt has been made to investigate the physiology of salt tolerance in Sorghum bicolor (L.) Moench hybrid CSH - 9 and Sorghum bicolor (L.) Moench variety SPV - 462. The biochemical changes taking place at different stages of germination under saline conditions has been also investigated.

The preliminary studies with CSH-9 and SPV-462 indicated that these cultivars respond differently to the salinity conditions especially during germination. Both the cultivars get affected by the NaCl as well as Na_2SO_4 salinity. Hybrid CSH- 9 is less affected during germination under saline conditions as compared to Var. SPV-462. Therefore, it is worthwhile to examine the process in details with reference to biochemical and physiological events to understand the probable mechanism of salt tolerance during germination process.

In the present studies the seeds were subjected to different concentrations of NaCl + $CaCl_2$ (1:1) and Na_2SO_4 with distilled water as control. The salt treatments were continued for 120 hours. The effect of salts on germination percentage, linear seedling growth and water uptake has been determined. The changes in some organic constituents such as carbohydrates, nitrogen and protein content have also been attempted. The influence of salinity on the level of inorganic constituents has also been estimated.

To understand the basic problem of salinity and the process of germination a brief review has been taken and discussed along with economic importance and agronomy of Sorghum bicolor (L.) Moench hybrid CSH- 9 and Var. SPV- 462 in Chapter - I. The material and methodology adopted for germination of seeds that followed for analysis, has been dealt in Chapter II. The important findings of the investigation have been critically discussed and correlated in the light of recent literature in

Chapter- III. The problem perspectives and significant findings of the investigation have been summerised briefly in Chapter-IV. The recent research papers, books, reviews and monographs used for discussion have been properly enlisted at the end in Bibliography.